



2024–2025 CN Winter Plan



Keeping the economy moving

While winter conditions have the potential to increase the risk of congestion and delays, the resilience and determination of CN railroaders to mitigate the inevitable challenges is ingrained in how we plan and run our railway.

ABOUT THIS REPORT

The *CN Winter Plan* is a review of the many steps we take to prepare for the challenges of operating a railway in a northern climate. The plan has two main objectives:

- Outline the challenges CN will face operating during winter.
- Describe the comprehensive, proactive actions, strategies and innovations CN implements to safely meet the needs of our customers by effectively executing our winter operations.

READ MORE

The *Winter Operations* page on our website provides online access to our complete suite of winter-specific safety guidelines, including our Customer Safety Handbook, Customer Track Maintenance Guide, CN Switch Clearing poster, and CN Winter Safety Checklist.

www.cn.ca/winter

PHOTO ABOVE:
Pedley, AB

COVER PHOTO:
Peterson, BC





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Message from Tracy Robinson

I am pleased to provide you with CN's 2024–2025 *Winter Plan*.

When one operates the most northerly Class I railway in North America, one does what one must to keep the trains running during winter. As outlined in this plan, we have developed and implemented a wide range of processes and innovations to prepare for and mitigate potential winter challenges. Together with our customers and supply chain partners, we find ways to address the challenges we face head on by identifying opportunities to strengthen the entire supply chain. Our objective is clear: to deliver the safest and most reliable service possible for our customers, and to keep the economy moving.

Reliable daily operations throughout winter are our priority. That's why CN was the first, and so far only, North American railway to equip specialized railcars with power and control systems to supplement a train's air brakes during extreme cold. Distributed air braking cars can reduce the need to shorten trains, improving service reliability and protecting capacity. Since their conception in 2006, CN has invested close to \$62 million to build and operate more than 100 air cars.



Blue River, BC

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“make the plan,”
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“sell the plan.”*

CN railroaders gear up for winter well in advance of the publication of this annual plan. In fact, we prepare for winter operations year-round. It's ingrained in our scheduled operating model, as we “make the plan,” “run the plan” and “sell the plan.” As such, we also continue to address issues that create uncertainty that extends beyond the usual unpredictability of weather. These include the Canadian government's role in labour policy, extended interswitching, and capital investment as well as how they affect CN's productivity and our ability to power the economy.

I extend my thanks to everyone who contributed to the 2024–2025 *Winter Plan*, especially all our railroaders who safely run the plan day in and day out. While the unpredictability of winter weather and the associated harsh operating environments certainly pose challenges, with the collaboration of all our partners, we can continue to build an end-to-end supply chain that supports the success of the North American economy, now and into the future.



Tracy Robinson
President and CEO

Highlights

TECHNOLOGICAL INNOVATION

CN is deploying the 4th generation of our Autonomous Track Inspection Program (ATIP) railcars, which measure the condition of hundreds of thousands of miles of track each year at train speed. The new ATIP technology uses ground-penetrating radar to provide detailed assessments of ballast and subgrade conditions. Then, artificial intelligence (AI) and trend analysis are used to prompt repairs before issues arise.

One of CN's ATIP railcars crosses the Thompson River in Walhachin, BC.



SUPPLY CHAIN VISIBILITY

CN's ever-growing suite of Application Programming Interfaces (APIs) offers robust supply chain visibility tools that demonstrate our commitment to managing customer supply chains through system integration. Our APIs allow our customers and supply chain partners to connect seamlessly and in real time with CN data for system-to-system "track and trace" information.

FASTER TRAIN TURNAROUND

CN is positioning locomotives with empty railcars at some customers' facilities until the empties are loaded. At facilities equipped with air compressors, the trains are kept powered up and aired up, reducing dwell times and allowing for faster turnarounds. For example, over 95% of CN-served facilities capable of loading grain unit trains participate in our program to fully charge trains with air in advance of crew arrival. Otherwise, in times of extreme cold, it can take 8–12 hours for a train to be fully charged with air by the locomotive.

INCREASED RESOURCE REQUIREMENTS

While we have recently grown our operating crew base by almost 9%, new federally imposed regulations are expected to necessitate hundreds of additional personnel in Canada to move the same amount of freight. The union representing CN's operating employees interpreted new regulations governing duty and rest period rules, paid sick days, and additional leave days to be "stacked" on top of similar provisions that had already been negotiated into our collective agreement. CN and the union are now working through a binding arbitration process to achieve a negotiated agreement.



In 2024, CN invested over \$1 million to overhaul 20 of its distributed air braking cars, replacing air compressors and other major components to ensure future reliability.

INCREASED CAPITAL INVESTMENT

For 2024, CN's capital expenditures are expected to increase to approximately \$3.5 billion. These investments are aimed at increasing the safety, efficiency, and capacity of our rail network as well as improving fluidity and accommodating growth. With more options and nimbleness, our capital program helps us to better respond to the unexpected, including extreme winter weather. We will continue to advance capacity projects and expect to bring several into service in the coming years, particularly new double-track projects in the Edmonton-to-West-Coast corridors.

ROLLING STOCK ACQUISITIONS

CN expects to take delivery of 750 new high-efficiency grain hopper cars in 2024–2025, building on our investment in hopper car fleet renewal of 3,500 new cars delivered since 2018. CN has also added 600 new ore cars to support our iron ore supply chain and 300 new bi-level autoracks to transport SUVs. CN maintains the largest high-capacity centrebeam fleet and one of the biggest boxcar fleets in the industry.

MAKING DISTRIBUTED AIR BRAKING CARS EVEN BETTER

In 2024, CN invested over \$1 million to overhaul 20 of its distributed air braking cars, replacing air compressors and other major components to ensure future reliability. Air cars can reduce the need to shorten trains, improve service dependability and protect capacity. CN continues to optimize the effectiveness of the air cars, establishing standards for air source configuration and placement within trains.

The Challenges

While winter comes every year, the frequency, severity, and exact location where operational challenges may occur are unpredictable and vary from one winter to the next. The winter conditions that affect the operation of a northern rail network can be summarized in four simple words: cold, snow, ice, and rain.

Cold

Extreme cold dictates the need for slower train speeds and shorter train lengths to ensure safety and reliability, which reduces operating capacity. Temperatures of -25°C (-13°F) and below affect the physical properties of steel wheels and rail. We call this the "tipping point." When steel is cooled it contracts, which adds stress on rails, increasing the likelihood of the rail pulling apart or breaking. Surface pitting on railcar wheel treads also increases as temperatures plummet, which can cause high impacts on the rail and wheel. Another consequence of cold temperatures is freezing of air brake gaskets and hoses, which can result in an inability to release or charge a train's air brakes.

Extreme cold weather also affects people, as low temperatures and wind chill limit the ability of train crews, maintenance personnel, and employees at our customers' facilities to work safely outdoors for prolonged periods. Warm clothing can mitigate the impact of cold temperatures to a point, but -40°C is -40°C (-40°F).



For more information, view our video *The Tipping Point* available at <https://www.cn.ca/en/your-industry/customer-reports/winter-situation-report/>

Snow

Heavy snowfall impedes operations in railyards, terminals and customer sites, limiting the ability to process railcars until the snow can be cleared. CN ensures safe operations with a specific focus on removing snow from tracks as well as from the roofs of containers, railcars and trucks. Blizzard conditions make it difficult to move train crews and other operational personnel where they are needed. Switches in our railyards, along our mainline and branch lines, and at our customers' facilities, even those equipped with snow melters, can become encumbered by snow. They need to be cleared before operations can resume. The accumulation of snow throughout the winter also raises the potential for avalanches that can block the mainline in British Columbia.

Ice

Ice can be incredibly harmful to rail operations, personnel, and infrastructure. Smooth ice such as a frozen puddle is a slipping hazard for our people and vehicles. Roadways and walkways need to be cleared of ice for safe walking and driving. A build-up of ice under a rail can result in the rail becoming separated from its tie plate, leading to a possible track disruption. Ice in the switch points and flangeways can prevent rail access to customers and lead to missed service. Ice jams in rivers and streams can cause overland flooding, potentially damaging the railbed, eroding embankments, or causing a washout. Of course, ice storms can be very damaging, leading to downed trees and power lines. The freeze-thaw cycle, where snow and ice melt during the day and refreeze at night, also poses a challenge to CN's network and customer facilities.

Rain

During the winter months, particularly in B.C., whether on the coast or inland, heavy rain can result in washouts that severely impact network fluidity. At the ports, rain can limit or even prevent the loading of ships with grain and other cargoes. These factors can lead to congestion at the port and backlogs along the supply chain. When a destination terminal, whether served directly by CN or by another rail carrier, cannot accommodate rail traffic, CN must hold trains at origin or along the route, slowing equipment cycle times and effectively reducing supply chain capacity. Rain can also exacerbate the freeze-thaw cycle described above.

FIGURE 1
Winter Impact on CN's Network



The map is based on historical data. "Severe conditions" indicates the portions of CN's network most likely to experience cold snaps (temperatures below -25°C / -13°F) at least twice per winter and for more than three days at a time.

Other factors

Beyond the natural challenges listed above, other factors affect the system's capacity during winter.

INCREASED RESOURCE REQUIREMENTS

CN is experiencing the direct impacts of the following new federal regulations:

- Duty and Rest Period Rules for Railway Operating Employees introduced in May 2023.
- Number of paid sick days workers in all federally regulated private sector workplaces are entitled to that came into effect in December 2022.
- Prior new government regulation for five leave days for workers.
- The "stacking" of the above regulations on top of similar provisions that had already been negotiated with the unions and embedded in our collective agreements.

CN's experience to date is that, as a result of these new government mandates, hundreds of additional personnel (about 15% more) are required in Canada to move the same amount of traffic. In 2023–2024, CN proposed capacity and resiliency improvements that would not compromise safety to the union representing our employees. However, the union has not been willing to entertain these changes. CN is now working through a binding arbitration process to achieve the necessary improvements.

Tough winter conditions also significantly reduce productivity since shorter, slower trains still need locomotives and crews to operate them. Moreover, when network disruptions occur (i.e., wildfires, floods, extreme cold, blockades, strikes, derailments), CN's ability to recover and rapidly move the backlog of freight is diminished.

EXTENDED INTERSWITCHING

In September 2023, Bill C-47 re-introduced extended interswitching in the Prairie provinces for an 18-month pilot, sunset in March 2025. Extended interswitching increases equipment cycle times, thereby reducing capacity and efficiency — the exact opposite of what Canadian supply chains need. For example, each week that average cycle times are extended for grain hopper cars, the grain supply chain capacity is reduced by about 400–500 cars, or 40,000–50,000 metric tonnes. This traffic can end up going to U.S. carriers instead of Canadian carriers. As the number of freight carloads diverted to the U.S. under extended interswitching goes up, work for Canadian railroaders goes down.

LABOUR SHORTAGES

CN's workforce is dependant on demand for rail service. Like many other companies, CN is adapting to a challenging labour market. Compounding a low unemployment rate, demand for skilled workers is very high in many sectors of the economy, especially in rural areas where many CN employees live and work. We have increased our efforts to recruit and retain employees as we strive to build a strong workforce that can reliably support economic growth. This challenge is exacerbated by the labour dispute where CN is attempting to reconcile the collective agreement governing our operating employees with the federal regulations imposed over the last few years.



A CN railroader clears ice from switch points in St-Lambert, QC.

While winter comes every year, the frequency, severity, and exact location where operational challenges may occur are unpredictable and vary from one winter to the next.



CN's high-capacity hopper cars being loaded at the Viterro Grain elevator in Vagreville, AB.

CUSTOMER FORECASTS

Accurate customer demand forecasts for all types of rail traffic are essential to planning the resources (employees and equipment) needed to deliver the best possible service, especially during winter. Unfortunately, such customer forecasts are not always shared with CN. When they are shared, they may not be shared well enough in advance. Furthermore, in recent years, it has been difficult for customers to forecast accurately. This results in a bigger challenge for CN in securing sufficient resources. Still, CN welcomes frequent and open communication with our customers to anticipate their needs and prepare for changes in demand.

INCREASED CUSTOMER DEMAND

Although rail system capacity is reduced by extreme weather and other challenges in wintertime, customer demand across many commodity sectors (e.g., grain, forest products, propane) is often at or near its annual peak during fall and winter. The result is greater pressure on the rail network and ports.

INCREASED ACTIVITY AT THE PORT OF VANCOUVER

Expansion of the Trans Mountain pipeline is increasing commercial vessel traffic in Burrard Inlet. There, ships pass beneath the CN Second Narrows lift bridge, which provides rail access to the export terminals on Vancouver's north shore. Under current rules, marine traffic has the right of way, which means trains must wait for the bridge to be raised and lowered, even for small recreational vessels like sailboats. Lifting the bridge more often reduces the amount of time trains can use the bridge and negatively impacts rail capacity, increasing the overall transit times for railcars. CN is engaged with customers, the Port of Vancouver and the Government of Canada on this issue. Our goal is to improve the predictability of bridge operations to help ensure both rail and marine traffic can maximize volumes.

Working Safely

At CN, safety is our core value year-round. While each season brings unique challenges, during winter we leverage comprehensive employee training, technological innovation and effective customer communications to deal with the issues that arise.

Employee training

First and foremost, we ensure our employees have the necessary tools and training to work safely and control exposures in the workplace. CN's National Training Centre in Winnipeg, MB, instills our strong safety culture in new hires, experienced railroaders and customers alike. They take hands-on and classroom training for all key railway jobs, including frostbite and hypothermia prevention. CN mentors delivered a robust curriculum to approximately 7,200 trainees in 2023 in Canada and the U.S.

CN railroaders receive enhanced communications and job safety briefings before every shift, including on the weather conditions they may face on the job. We recognize it may take a little more time to complete a task during winter than it typically would during warmer months. Wearing the appropriate cold weather gear may slow down certain activities and, to prevent cold-related injuries, CN crews take warming breaks. If harsh conditions prevent safe operations, CN as well as our customers and supply chain partners may need to change the train plan (e.g., operate only during the warmer daylight hours) and/or fully suspend local train operations during the most extreme periods.

Helping our customers prepare for winter

When it comes to winter, CN and our customers are in it together. Long before the first snow falls, we work with our customers to ensure they are

prepared for the arrival of winter weather. Through shared safety tips, customer visits, and online tools, we are committed to partnering to reduce exposures and protect supply chain fluidity.

Customers can help avoid service disruptions and minimize the risk of injuries by clearing snow from tracks, gates, switches, flangeways, derails, roads, and crossings before CN operating crews arrive. The accumulation of snow must not interfere with crew visibility or safe rail traffic movement within a customer's facility. Snow should be piled at least 6 feet away from tracks. If customer facilities have not been properly cleared of snow, they are asked to call CN Customer Service at **1-866-926-7245** to cancel service for that day. This will help avoid delays and penalties, as well as maintain supply chain fluidity.

To protect safety, customers must also ensure icy walkways, particularly trackside, are sanded and/or salted to prevent injuries. Furthermore, snowfall can easily hide debris where crews normally walk, so ensuring all debris is cleared before winter starts is essential to keeping safe.

CN's Customer Winter Toolkit available at cn.ca/winter provides online access to our winter-specific safety guidelines, including our Track Management Inspection Checklist, Customer Safety Handbook, Customer Track Maintenance Guide, and CN Winter Safety Checklist.

Technological innovation

CN is leveraging innovative technologies to enhance safety and provide more efficient and fluid operations to support our customer service. Using advanced technologies like predictive analytics to identify problems before they happen helps avoid network disruptions and keep traffic moving in winter.

- CN uses over 2,800 wayside detectors on our right-of-way to measure the condition of train components, such as wheels and bearings.
- Our 7 automated inspection portals use machine vision and AI to assess the health of our railcars as they travel the network.
- In addition, our 11 ATIP railcars measure track conditions over hundreds of thousands of miles a year at normal train speed. In 2024, we deployed our 4th generation ATIP technology: ground-penetrating radar to provide detailed assessments of ballast and subgrade conditions.

Combined, our safety inspection technologies produce millions of data points a day that, along with AI and trend analysis, are used to prompt the repair or replacement of a component before it fails. As a result of these innovations and others, the potential for major mainline disruptions due to track and equipment malfunction, particularly during winter, is reduced.

CN is leveraging innovative technologies to enhance safety and provide more efficient and fluid operations to support our customer service.

Wayside detectors in foreground stand ready to inspect approaching CN train in Blue River, BC.



ABOUT CN'S WAYSIDE DETECTORS

- **Hot box detectors** monitor the condition of wheel bearings to identify overheated components before they reach temperatures that can lead to failure.
- **Cold wheel detectors** are placed at the bottom of long grades where trains typically apply brakes. Since the braking process generates heat, cold wheels are flagged for brake system inspection.
- **Wheel impact load detectors** measure the impact of each wheel going over the detector to prevent parts rattling loose or damage to tracks. In winter, CN's enhanced algorithm considers the frozen subgrade, allowing CN to safely reduce the number of unnecessary wheel replacements and increase the availability of railcars for customers.
- **Dragging equipment detectors** look for anything that is hanging from the train.
- **Acoustic bearing detectors** monitor the sound signatures of bearings to find defects before they generate enough heat to be spotted by hot box detectors.
- **Broken wheel detectors** use various technologies, including wheel weight gauges, lasers, cameras, and machine pattern algorithms, to identify defects.

Meeting the Needs of Our Customers

CN puts the customer at the centre of everything we do. We collaborate with our customers to anticipate their needs so we can provide consistent and efficient service and help them win.

Supply chain fluidity

When considering the capacity to move rail traffic during winter, CN is just one component of interconnected supply chains. In fact, 35% of the volume CN handles is interchanged with other railways to get from origin to destination. This means the ability to move goods on the rail network depends on the fluidity and reliability of all rail carriers, not just CN.

If any part of the supply chain experiences delays due to challenging winter weather conditions or other disruptions, the impact will be felt by all parts of the supply chain. For instance, if a receiver cannot unload railcars in a timely fashion (i.e., due to rain), trains directed to that terminal must be held back to avoid creating more congestion. As a result, the availability of equipment for everyone is reduced, especially since many CN customers draw from the same pool of CN-supplied railcars. Major shifts in car demand or cycle times will also challenge other resources, such as crew availability.

OPERATIONAL DATA

The Government of Canada's 2023 Budget authorized the establishment of a National Supply Chain Office (NSCO) to "work in collaboration with industry to respond to disruptions and better coordinate action to increase the capacity, efficiency, and reliability of Canada's transportation supply chain infrastructure".¹ For this to occur, a balanced

approach that improves visibility at the operational level with real-time data from all participants in the supply chain will help increase throughput and avoid congestion. We expect the NSCO or Transport Canada to deliver a framework that will greatly assist operations in the logistics chain. Also, Canada needs greater transparency of reporting. For example, CN's weekly Western Canadian Grain Report summarizes all the major events affecting the supply chain. Unlike industry and government data, these reports get into the "why."

CN continues to report weekly supply chain performance metrics available at <https://www.cn.ca/en/investors/key-weekly-metrics>

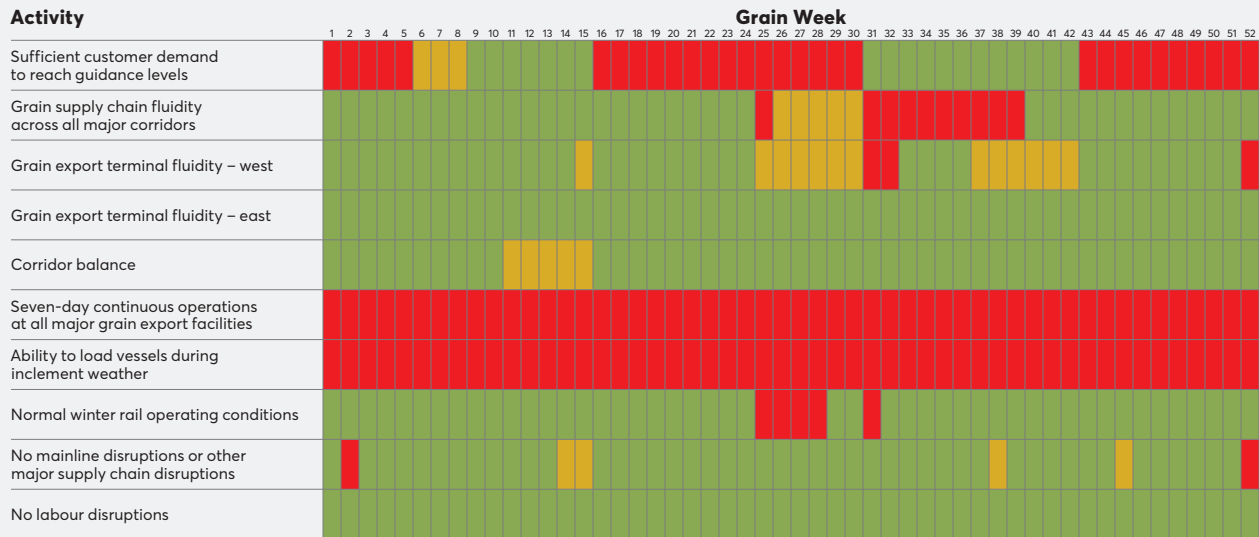
ACTIVE FLEET MANAGEMENT

We actively manage our fleet to reduce congestion by matching the flow of inbound shipments to the throughput of end terminals, especially in areas experiencing extreme weather conditions. We also contract the active fleet during periods of tier restrictions (see p. 24) to maintain fluidity on the mainline.

Considering anticipated demand levels, as well as experience gained in previous winters, CN will continue to manage constrained supply chains with car rationing when demand surges exceed capacity. This process ensures goods continue to flow on all supply chains and maximizes overall system capacity. Car rationing is not new, especially in sectors where demand is cyclical such as grain and forest products.

¹ www.canada.ca/en/transport-canada/news/2023/04/minister-of-transport-highlights-budget-investments-to-make-life-more-affordable.html

FIGURE 2



Planning with customers

To maximize the efficiency of the end-to-end supply chain, especially during winter, CN and our customers should closely coordinate activities. For us to be able to effectively allocate resources such as crews, railcars, locomotives, and track capacity in an efficient way, we require up-to-date and accurate information from our customers on their needs and expectations. This calls for joint planning with all stakeholders on a sector-by-sector basis.

Ideally, with accurate customer forecasts that stretch at least six months out, CN can proactively plan without having to make assumptions based solely on economic indicators and historical data. We welcome higher demand for rail service, and capacity may be added, but it will only become available after additional resources (e.g., cars, locomotives, operating crews) have been acquired.

Resource planning

Resource planning requires sufficient lead time to deliver the best possible service. Long lead times are needed to recruit and train crews (~9 months), acquire rolling stock and locomotives (12+ months), and build track and other rail-related infrastructure (18+ months). From initial planning to completion, infrastructure

investments can take even longer, depending on the project's scale, complexity and permitting processes.

CN converts short-term demand forecasts into train counts, which in turn are converted into crew and locomotive counts. CN monitors traffic levels on individual traffic corridors to help assess what additional track infrastructure is required. When all of us work together, we can achieve our collective objective—a rail system that operates safely and at peak efficiency.

Supply chain visibility

CN has deployed several Application Programming Interfaces (APIs) to our customers and supply chain partners, allowing them to connect seamlessly and in real time with CN data for system-to-system “track and trace” information. APIs, in combination with enhanced employee and automated reporting (e.g., hand-held devices, GPS, wayside detectors) unlock actionable data that empowers our customers and partners to increase revenue and create new efficiencies. CN’s robust supply chain visibility tools demonstrate our commitment to improving data quality and supply chain responsiveness through system integration.

Read more: <https://www.cn.ca/en/customer-centre/tools/api>

Markets

The full context of customer demand during winter requires assessing each sector individually, as each brings unique needs that CN must anticipate.

The following are examples of key actions CN is taking to serve specific markets:

PROPANE

With propane demand growing significantly during winter, a reliable supply chain is crucial. CN works with our customers and loading sites on train blocking to reduce switching time and the need to shift cars from one train to another along the route. Also, shippers are encouraged to preposition inventory closer to their end markets to offset cold and precipitation impacts on the supply chain during the heart of winter.

AltaGas' propane export terminal on Ridley Island in Prince Rupert, BC.



INTERMODAL

Well in advance, we build an integrated operating plan with key stakeholders like our customers, port partners and Canada Border Services Agency to prepare for winter. This includes coordinating extended delivery times with customers for domestic intermodal shipments as needed to account for winter weather. We also establish communication protocols and an expedited escalation process that aim to minimize the impact of winter operating conditions. To build resiliency within the plan, we store railcars at strategic locations across the network that are most vulnerable to tier restrictions (see p. 24). We also take steps to ensure the readiness of our temperature-controlled fleet. Throughout winter, our inland terminals focus on safety by removing snow from tracks, container roofs and railcars. Our port partners on both Canadian coasts incorporate control measures to protect on-dock fluidity and capacity to sustain efficient operations. In addition, to maintain reasonable velocity this winter, the focus will be to run more destination trains to key consumer markets when the volume permits.

Ideally, with accurate customer forecasts that stretch at least six months out, CN can proactively plan without having to make assumptions based solely on economic indicators and historical data.



Prince George, BC

FOREST PRODUCTS

CN is the largest rail carrier of forest products in North America. We maintain the largest high-capacity centrebeam fleet and one of the biggest boxcar fleets in the industry. We work with shippers and receivers to preposition inventory at strategic transload and storage points before winter arrives. We also collaborate to maximize the throughput of boxcars at unloading terminals to avoid congesting the Port of Vancouver. This program relies on the active participation of our customers and terminals to coordinate inbound loads with warehouse space, vessel berths, and container availability. Finally, we actively monitor for locations off the CN rail network with car dwell times exceeding four days and we limit the number of cars being sent into these areas to help reduce congestion. While this is a year-round program, it is particularly important during winter.

FRAC SAND

To prepare for winter, we work closely with our sand customers to move as much product as possible before the cold starts. We also offer to find locations where customers can preposition frac sand railcars closer to where the sand will be needed, helping to support customers during inclement winter weather.

GRAIN

Peak grain demand occurs in fall and winter. Over the past decade, CN's network infrastructure investments and hopper car fleet renewal have been complemented by grain handling capacity improvements. Most of the new grain handling facilities built in Western Canada have hook-and-haul loop tracks that allow more cars to be spotted in a single placement.

Over 95% of CN-served facilities capable of loading grain unit trains participate in our program to fully charge trains with air in advance of crew arrival. Otherwise, in times of extreme cold, it can take 8–12 hours for a train's braking system to be fully charged with air by the locomotive.

Over 90% of CN-supplied grain cars are committed to customers in advance of harvest through commercial agreements. These agreements include reciprocal penalties for both CN and our customers. When considering the eligibility of grain car orders, CN ensures our customers have shipment authorization from the receiving terminal, which facilitates efficient car order management and supports overall supply chain fluidity. Last winter, CN supplied over 90% of hopper cars within three days of the week for which they were ordered.

OTHER BULK COMMODITIES

As is the case for grain, having CN's coal and potash trains charged with air at the mines reduces the time needed to charge the train's braking system, especially in cold winter conditions. As with all commodities, CN adjusts the length of unit trains to ensure continued reliable handling during cold winter operating conditions. As well, side release agent is applied to coal cars prior to loading at coal mines as coal can freeze to railcars during winter. This practice allows for clean unloading of coal at the terminal, reduces double dumping of railcars, and decreases coal carry back to coal mines. Seamless unloading at ports that handle multiple commodities for multiple shippers is vital for an effective supply chain.

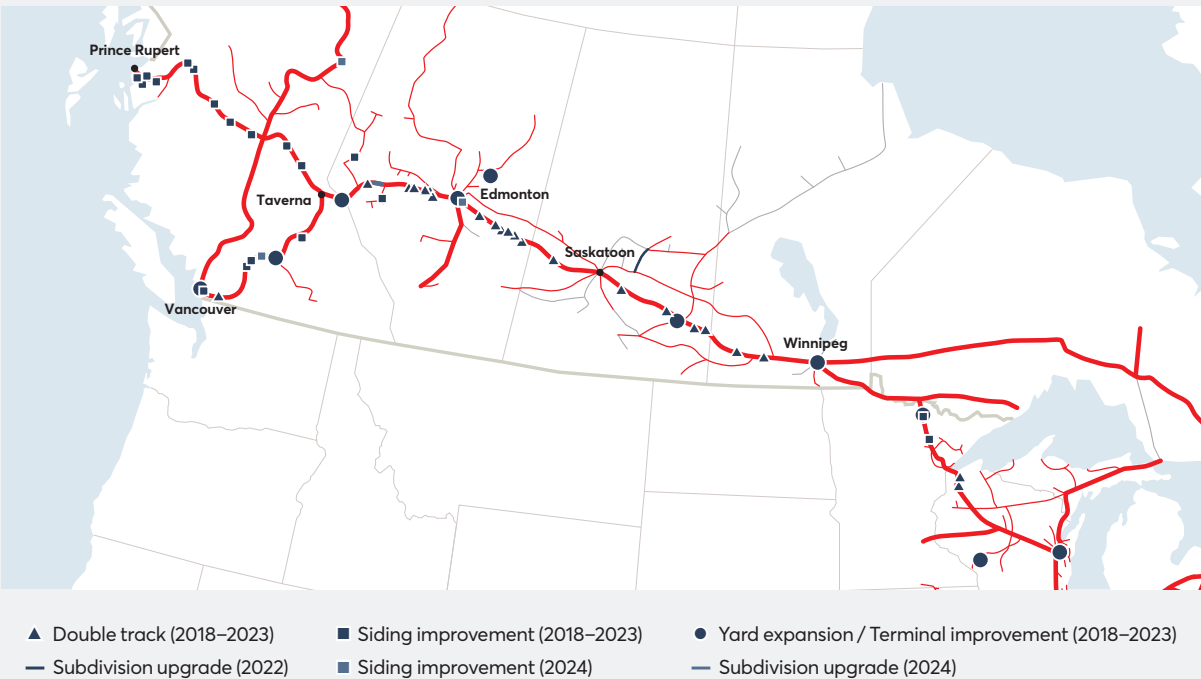
Striving to Improve Network Performance

We are focused on improving the safety, capacity, and reliability of our network. The evidence is an effective CN capital investment program that totaled more than \$15 billion over the past five years, with nearly two-thirds of that investment going into track infrastructure and other railway assets.

Investment in rail infrastructure

For 2024, CN's capital expenditures are expected to increase to approximately \$3.5 billion. These investments are to ensure the continued safe and efficient operation of our rail network as well as to increase capacity, improve fluidity and accommodate growth. Our capital program also provides more options and nimbleness to better respond to the unexpected, including extreme winter weather.

FIGURE 3
Major Capital Investment Projects between 2018 and 2024



New major rail infrastructure capacity enhancement projects in Western Canada coming into service in 2024–2025 include:

British Columbia	Siding extension (Jaleslie) to accommodate longer trains and improve throughput to Vancouver.
	Siding extension (Septimus) to add capacity and improve throughput to Fort St. John.
Alberta	Siding upgrade (Clover Bar) to improve throughput to Edmonton.
	Subdivision upgrades (Edson) to reduce corridor congestion and enhance network velocity.

We will continue to advance capacity projects and expect to bring several into service in the coming years, particularly new double-track projects in the Edmonton-to-West-Coast corridors.

Managing major infrastructure projects on busy rail corridors is a highly complex task. It requires significant planning and resources and involves some temporary disruptions of service to provide crews with the time they need to do their work safely. The projects are planned for completion before the onset of winter.

Locomotive-specific initiatives and actions

This winter, CN expects to have approximately 1,950 locomotives, in line with 2023 and 2022. With 93 locomotives undergoing DC-to-AC modernization, about 45% of CN’s locomotive fleet will have AC traction this winter. AC locomotives have better traction and are less prone to failures, especially during winter.

CN takes multiple proactive steps in advance of winter to improve overall locomotive resiliency and availability. Our locomotive winterization program focuses on traction motors, air components, and cooling systems. The scope of the work is adjusted using historical performance trends to mitigate the top causes of winter failures and improve performance in harsh winter conditions. Also, by completing needed locomotive inspections prior to the onset of winter, CN keeps locomotive repair shop space open to repair locomotive failures during winter.

As part of CN’s “Train Ready” concept, locomotive power is positioned with empty railcars spotted at customers’ facilities and remain with the empties until

loaded. At facilities equipped with air compressors, the trains are kept powered up and aired up. This improved locomotive availability reduces dwell times and allows for faster turnaround of assets.

Rolling stock planning and management initiatives

Major CN investment initiatives specific to rolling stock include the following:

Grain hopper cars	750 new-generation, high-efficiency grain hopper cars added in 2024–2025
Ore cars	600 cars added in 2023–2024 to support our iron ore supply chain
Bi-level autoracks	300 cars added in 2023–2024 to transport SUVs

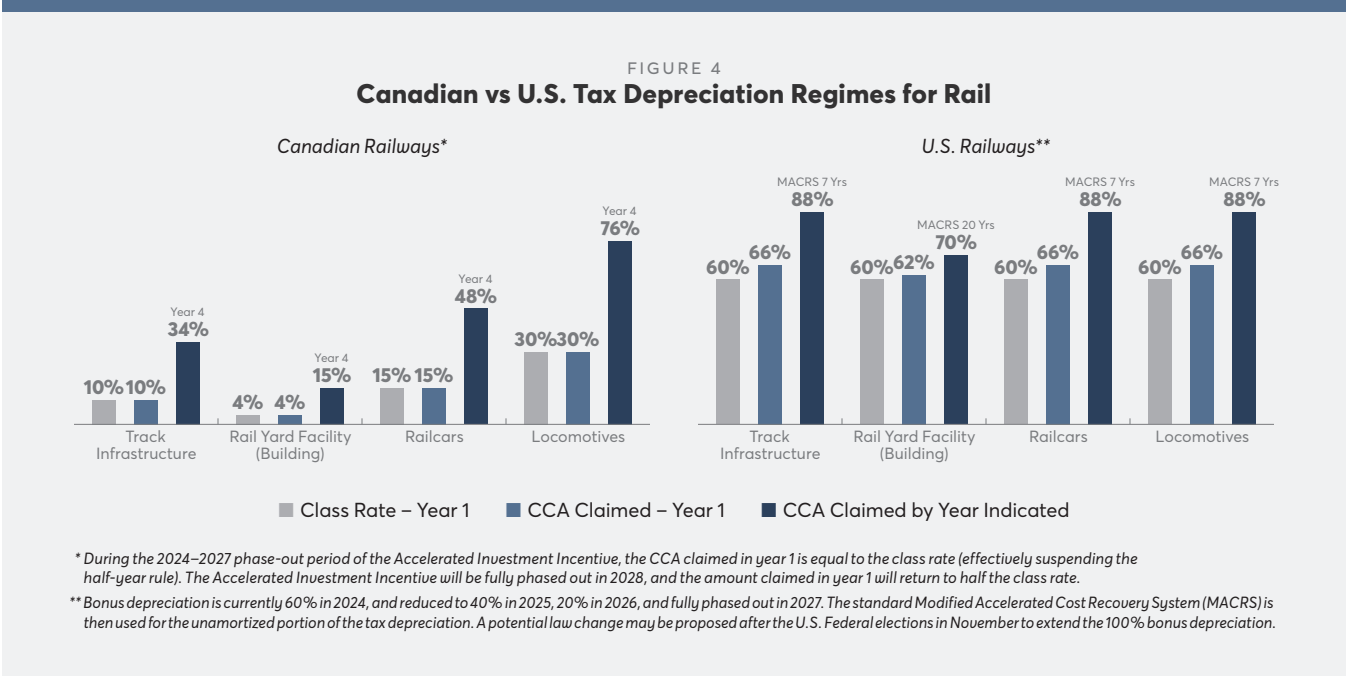
Demand is cyclical for many traffic segments for which CN supplies railcars and our numerous inspection programs translate into fewer equipment failures. When CN-supplied equipment is put into storage during slow periods, comprehensive inspections are required before the equipment can be put back into service in advance of demand surges. For example, we proactively inspect and repair stored hopper cars in August and September in preparation for the peak grain season that runs through the fall and winter. CN also has a summer reliability maintenance program for railcars that uses repair data to proactively identify cars with a higher probability of failure. Additionally, CN ensures its fleet of temperature-controlled heated and refrigerated containers are ready to meet customer demand in advance of winter.

Addressing bottlenecks

Extreme cold is not the only thing we can count on in winter. Heavy, persistent rainfall occurs at Canada's West Coast ports every year. And every time it rains, grain loading slows down at terminals. However, wet weather should not impact modern grain terminal operations. Process and infrastructure solutions are in place in the U.S. Pacific Northwest, which also experiences a lot of precipitation. Rain should not reduce supply chain capacity, especially in Vancouver where capacity is limited. If a grain terminal is not able to unload grain from railcars, loaded grain trains cannot be moved forward. CN is forced to hold back trains enroute to port as well as at origin until the situation improves. For instance, in late October 2022, CN had nearly 20 grain trains held back on the Prairies or along the route to Vancouver to avoid overloading the port after rain delays. Those rain delays also meant grain cars were not getting emptied and cycled back to the Prairies, negatively impacting grain end-to-end supply chain capacity. The impact of the grain vessel rain delays on the grain supply chain also negatively impacted overall rail network fluidity for other commodities. The NSCO

should take whatever action is required to enable the loading of grain into vessels even when it is raining.

CN has multi-year capital projects focused on removing other bottlenecks and creating new capacity around the ports of Vancouver and Prince Rupert. Some of these projects are constructed in conjunction with the port authorities and the Government of Canada. More investment is required from all parties in the Canadian supply chain to expand its capacity. This will require focus and coordination between governments, railways, shippers, and others to strategically invest. To support immediate investment in capacity across the entire Canadian supply chain, the Government of Canada should implement supportive measures in the form of tax policies and accelerated depreciation measures. A supportive regulatory environment should allow all parties in the supply chain to benefit from these new measures associated with projects that expand the capacity of the Canadian supply chain. This needs to occur now, to support Canada's future economic growth. The following table compares Canadian and U.S. tax treatment of investments made in the rail industry, showing the significant discrepancy between both jurisdictions:



Making the most efficient use of the capacity available in all rail corridors throughout the year is another way customers can help avoid bottlenecks. For example, CN's Eastern Canadian network is underutilized and represents an opportunity to increase shipment volumes, especially during peak demand periods in winter.

People initiatives and actions

Beyond investing in physical network infrastructure, CN invests in our people. We are focused on ensuring we have the right number of people to deliver the best possible service. We assess the size of our operating crew base at the regional and terminal level, taking into consideration the time required to train locomotive engineers, conductors, and others working on the railroad. Between April 2023 and May 2024, the number of available CN operating employees grew by almost 9%.

Heading into this fall and winter, CN will have rail operating rules-qualified managers available to support operations during challenging winter conditions and periods of high demand. CN also has rapid deployment teams of dedicated managers from relevant departments in place to respond as needed.

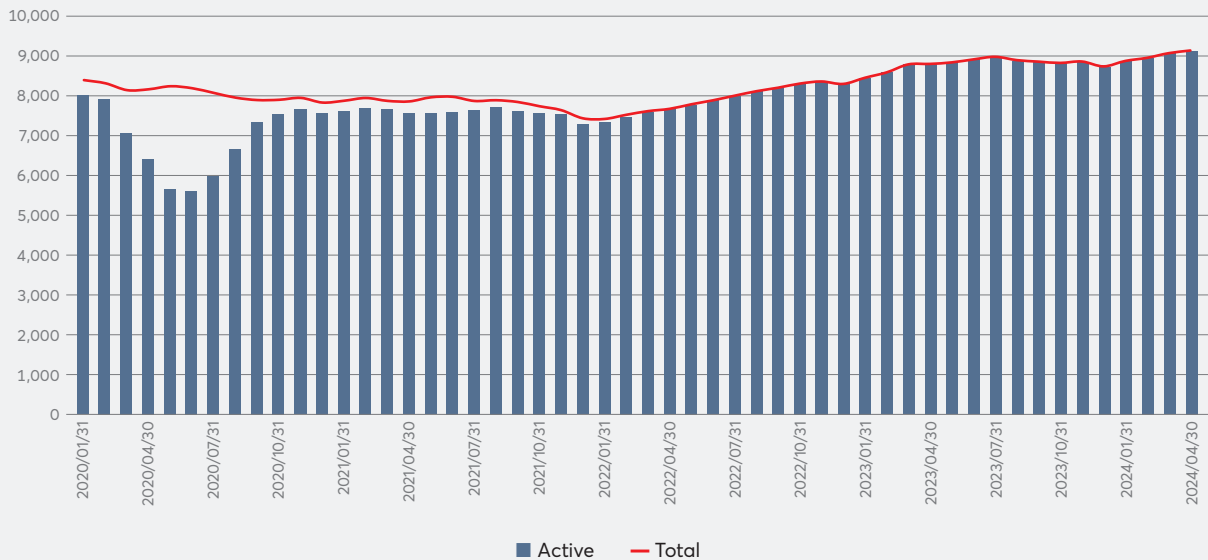
Based in part on rail network capacity demand forecasts, CN expects there will be opportunities to temporarily deploy operating crews from areas of anticipated crew surplus to areas where additional operating crews are needed. That said, even when employees take short-term assignments to support a high-demand area, it still takes time to familiarize them with their new region.

In a challenging labour market with low unemployment, CN took measures to attract potential new employees to careers in rail operations, including:

- Providing hiring bonuses of up to \$10,000 in hard-to-recruit areas.
- Holding targeted recruitment sessions at job fairs and during evenings and weekends.
- Working with post-secondary and technical schools to recruit graduates.
- Fostering vibrant relationships with underrepresented groups as well as proactively promoting job opportunities and our commitment to diversity, equity and inclusion.
- Using new online recruitment and interview tools to accelerate the hiring process.

The ability to fill a position is dependent on labour and economic dynamics in the region, including proximity to major population centers, cost of living, availability and affordability of housing, as well as availability of education and other services. It is more difficult to recruit and retain crews in remote parts of the CN network. Those regions also correspond to some of the heaviest rail traffic density and demand pressure across multiple segments. This is the prevailing environment in which CN must attract and retain employees to help us safely provide rail service this winter.

FIGURE 5
CN Network-Wide Operating Crew Base





Disciplined adherence to the operating plan

CN has successfully implemented a scheduled railroad strategy, emphasizing a back-to-basics approach, strict adherence to the operating plan, and improved internal and external communications. We "make the plan," "run the plan," and "sell the plan." Our focus on running the schedule minimizes starts and stops, enhancing network velocity, asset utilization, and network capacity, which enables us to provide superior customer service. We remain committed to enhancing our performance and collaborating with customers and supply chain partners to identify further efficiencies, setting the stage for a successful winter.

A coordinated network plan also facilitates adjustments to volume fluctuations and boosts network resilience against disruptions from extreme weather and other factors. Our scheduled railroading approach serves as a foundation for future growth.

And we know it is working. In 2023, our scheduled railroading produced exceptional results compared to 2022. Car velocity, measured from origin yard to destination yard including yard time, increased 9% to 213 miles per day, reaching levels not seen since our record performance in 2016. Dwell time across all yards improved 8% to 7.0 hours. This faster turnaround directly impacts capacity by returning equipment to origin more quickly.

Through the Local Service Commitment Plan, CN ensured customers received their ordered cars within the committed switch window, achieving a 91% rate in 2023 compared to 80% in 2022.

We also adjusted volumes on local branch lines to align with mainline capacity during extreme weather, allowing for quicker recovery of network productivity after prolonged severe winter conditions in 2023. Early and conservative implementation of tier restrictions further supported faster velocity recovery once cold conditions eased (see p. 24 for more information).

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Enhancing Network Reliability

The health of the CN mainline is critical to rail operations, and that is especially true during winter. CN actively manages traffic coming onto the mainline from feeder lines and yards to maintain fluidity.

Protecting CN's mainline fluidity

This winter, CN will once again focus on ensuring local rail service is adjusted to match the capacity of the mainline network to accept traffic during periods of extreme weather. This will allow network productivity to recover quickly at the end of any prolonged periods of widespread extreme winter weather. CN will also continue to work with customers to right-size their private railcar fleets, as surplus inventory is not stored on CN's tracks during winter.

Maximum train lengths and other initiatives during extreme cold

When temperatures drop to -25°C (-13°F) or lower, train lengths must be reduced to maintain pressure in the train's air braking system. Shortened trains mean more trains, crews and locomotives to move the same volume, leading to increased congestion in railyards and potential delays. Prolonged extreme cold can have ripple effects across the network, causing widespread disruptions. CN uses supplemental air

sources like distributed power (DP) locomotives and distributed air braking cars (an innovative employee-designed solution) to reduce the need to shorten trains while ensuring safe operations. CN continues to innovate, enhancing capacity, resilience, and network fluidity while maintaining safety during severe weather.

DISTRIBUTED POWER

CN operates trains using either conventional power, with locomotive(s) positioned solely at the head of the train, or distributed power (DP), where additional locomotive(s) are strategically placed mid-train and/or at the rear. These DP locomotives are remotely controlled from the lead locomotive. DP provides more uniform tractive effort, reduces in-train forces, and improves braking efficiency and train reliability. While DP is used year-round, it offers additional advantages during winter operations. DP helps maintain consistent air pressure for brakes, even in extreme cold, reducing the need to shorten trains. CN's use of DP increases each winter, particularly across Western Canada.

TIER RESTRICTIONS

CN implements a three-tier system to determine maximum train lengths based on trackside temperatures. Early activation of tier restrictions helps maintain network fluidity and enables quicker recovery after cold snaps. Effective communication between CN and external stakeholders is critical during these periods. Anticipating cold weather and preparing tier-restricted trains at terminals proactively is key to mitigating impacts. Given the benefits realized in the last couple of winters, CN will continue to implement tier restrictions early. This proactive approach accelerates network recovery when temperatures improve.

FIGURE 6
Maximum Train Length (In Feet) Allowed at Specific Temperatures

			A – AIR SOURCES (1x1x0)		B – ADDITIONAL AIR SOURCES ADDED	
TIER LEVEL	TEMPERATURE		CONVENTIONAL (HE ONLY AIR SOURCE)	MAX DISTANCE BETWEEN AIR SOURCES	MAX TRAIN LENGTH	3RD, 4TH, 5TH AIR SOURCE
	°C	°F				
ALL NON-INTERMODAL, NON-SINGLE-COMMODITY TRAINS						
Tier 1	-25	-13	7,000	6,000	9,000	For each additional air source added beyond the 1x1x0 configuration, permissible train length can be increased by 1500 feet per additional air source, up to a maximum train length of 12,000 feet. Maximum of five air sources to be used on a train.
Tier 2	-31	-24	5,000	5,000	7,500	
Tier 3	-36	-33	4,000	4,000	6,000	
ALL INTERMODAL AND BULK COMMODITY TRAINS						
Tier 1	-25	-13	8,000	6,667	10,000	For each additional air source added beyond the 1x1x0 configuration, permissible train length can be increased by 2000 feet per additional air source, up to a maximum train length of 12,000 feet. Maximum of five air sources to be used on a train.
Tier 2	-31	-24	6,000	5,667	8,500	
Tier 3	-36	-33	4,500	4,500	6,700	

Notes:

1. For the purposes of this table, Distributed Power (DP) can be remote locomotives or distributed braking cars.
2. Optimal placement of a mid-train air source is 2/3 from the head end for air flow purposes.
3. Air Source placement should be evenly distributed in train when 3 or more air sources used.
4. Maximum of 5 air sources on a movement.
5. Combined flow of 3/4 air sources cannot exceed 160CFM. Combined flow for 5 air sources cannot exceed 200CFM.
6. For >3 air sources, movement must have minimum of two locomotives with operative dynamic brake.

KEY TRAIN SPEED RESTRICTIONS

In addition to tier restrictions, Rules Respecting Key Trains and Key Routes limit the speed of certain trains carrying dangerous goods depending on ambient temperature. Although these speed restrictions are intended to provide an additional level of safety, they nevertheless slow down other trains behind them and can impact the capacity of the entire network.

The rules include an option for railways to submit a Winter Operations Risk Plan for Higher Risk Key Trains, which provides for different speed thresholds for sections of track that meet specific safety requirements. CN has developed and implemented a Winter Operations Risk Plan that allows for more flexible winter operations.

DISTRIBUTED AIR BRAKING CARS

Unique among North American railroads, CN has modified boxcars into distributed air braking cars equipped with air brake power and associated control systems. As with DP, these cars supplement the air supply for the train's brake system. Launched in 2006, CN now has more than 100 air cars strategically deployed during the colder months across Canada and the U.S. Midwest. Over time, CN has significantly enhanced these air cars with improvements to make them more reliable. Each spring, the air cars come back to Transcona Shops in Winnipeg, where they receive extensive preventative maintenance to ensure they are ready for the coming winter.

In 2024, CN invested over \$1 million to overhaul 20 of its air cars, replacing air compressors and other major components to ensure future reliability. CN analyzes remote-sensing data to optimize the effectiveness of the air cars, establishing standards for air source configuration and placement within trains. Since entering service, CN has spent \$61.6 million on its air car program. The air cars have covered more than five million miles, proving to be a key CN-built innovation in maintaining air brake pressure during cold weather.

OPERATING WITH HIGHER AIR FLOW

The air flow in brake hoses can vary greatly due to leakage, especially as trains travel through regions with significant temperature differences. For instance, a train moving from an area at -20°C (-4°F) to another at -40°C (-40°F) will experience an increase in air flow demand of up to 4.5 times. CN addresses this challenge by incorporating additional air sources such as DP and air cars.

When current train brake rules were established, they set a maximum air flow requirement of 90 cubic feet per minute (CFM) for DP trains. They did not account, however, for the potential of more than two or three air sources. Advancements now support up to five air sources, all managed by a single locomotive. Between 2020 and 2022, CN conducted extensive lab and field tests, including three Transport Canada-approved test exemptions. These demonstrated that additional air sources improve brake system performance even when exceeding the 90 CFM threshold. Based on these results, CN secured a four-year exemption from Transport Canada in December 2022.

CN's distributed air braking cars supplement the air supply to a train's air brake system during colder weather.



ENHANCED SET-OUT

Enhanced set-out is another operational strategy CN plans to employ this coming winter to boost performance and resiliency. For example, when a DP-equipped train approaches a siding, part of the train can be set aside with a locomotive. Using advanced software approved by Transport Canada, the locomotive can automatically shut down and restart as needed to maintain air pressure. When an operating crew reconnects with that portion of the train, they can depart quickly, avoiding long delays to recharge the air brake system.

AIR GASKETS

Each railcar air hose connector contains a rubber gasket, which can become less effective as it wears or freezes, leading to increased air leakage. CN routinely replaces gaskets during regular maintenance to enhance performance. Additionally, CN is researching and testing new gasket materials and options. At the Melville, SK, yard, CN is piloting a promising technology that uses thermal and acoustic imaging to detect even minor air brake system leaks.

CN continues to innovate, enhancing capacity, resilience, and network fluidity while maintaining safety during severe weather.



BIG DATA SAVES FUEL

CN leverages vast amounts of data through its locomotive telemetry systems to enhance performance and fuel efficiency. The Horsepower Tonnage Analyzer utilizes this data to optimize the locomotive's horsepower-to-tonnage ratio, further minimizing fuel consumption and improving operations during cold weather.

TRAIN BRAKE WINTER OPERATING PLAN

CN has developed and implemented a Train Brake Winter Operating Plan that is in effect between November 15 and March 31 each year. The plan aims to improve the reliability of train operations by including enhanced train brake inspection and testing requirements for unit trains operating on mountain grades when the temperature is at or below -20°C (-4°F).

Response readiness

When dealing with adverse winter weather, time is of the essence. The key is advance planning to have the people and equipment in place to respond as quickly as possible to an avalanche, washout or other track damage. CN has taken multiple steps to be ready to act when required:



- Adding track patrols to identify problems and respond to them more quickly.
- Deploying signals employees and track repair crews simultaneously to remove debris or snow from track and ensure signals are operating properly. This includes ensuring CN's 1,400-plus heaters, fans and other devices are operating properly to keep switches clear of snow and ice build up.
- Ensuring Engineering contractors are primed and engaged, with added training and standards review to accommodate for winter conditions.
- Deploying Mechanical repair teams (mechanics and electricians) in key locations to provide critical corridor coverage. Having teams deployed in the field rather than dispatching them from large central terminals saves time and preserves capacity.



- Maintaining a strategic reserve of locomotives in critical corridors to limit delays caused by online locomotive failures or when locomotive demand exceeds supply.
- Staging emergency ballast and track panels in strategic locations to be able to deploy these materials quickly in the event of a track disruption.
- Deploying backup power generators across the network, allowing critical operations to continue even during localized or widespread power failures.
- Having an inventory of critical spare parts reduces repair shop dwell time and translates into more locomotives and other equipment out in the field.
- Maintaining a supply of tools and equipment in remote areas. These include portable heaters, wrap-around hoses and other tools and equipment that are often useful in winter, saving time and keeping the trains running.



- Ensuring the right-of-way and yards are free of obstacles before the snow arrives to reduce the risk of slips, trips and falls.
- Putting up snow fences to protect track infrastructure in open windy areas. Simple and effective, snow fences help prevent snow accumulation on switches and track.
- Strategically prepositioning snow-clearing equipment in the right areas.
- Implementing the CN Winter Situation Report, a daily snapshot of current weather conditions across the CN network that is updated every morning at 9:30 a.m. ET. It includes the cold temperature tipping point and the effects it has on tracks, locomotives, and railcars. For more information, visit <https://www.cn.ca/en/your-industry/customer-reports/winter-situation-report/>

Weather forecasting

CN uses customized weather forecasts based on sophisticated meteorological models to identify areas of the network that are expected to experience persistent cold or other extreme winter weather conditions. As well, CN engages with meteorological experts to evaluate and implement proactive solutions. When extreme cold weather is anticipated and CN will need to implement train length restrictions (see p. 24), we will advise customers in advance of the potential need to adjust their individual local service to match mainline network capacity.

With weather forecasting, resources can be moved into the regions that are going to get hit the hardest by extreme weather, with emphasis on keeping yards fluid and preventing congestion. CN must plan for varying weather conditions along the entire route of the train and make informed decisions about train crews, movements, and locomotives to help keep the network fluid.



Chetwynd Subdivision, BC

Avalanche mitigation

The advance weather information is even more critical considering the risk of avalanches along mountainous corridors. CN's avalanche program has been in place since the 1980s, and is focused on avalanche forecasting, control, avoidance, and detection. The CN mainline subdivisions that see the most avalanche activity on an annual basis are the Albreda, Robson, Bulkley, Skeena, Chetwynd and Tumbler subdivisions located in northern British Columbia. CN's B.C. South region also sees intermittent avalanche activity. In total, CN's avalanche atlas identifies 240 individual avalanche paths that require monitoring.

We work closely with our avalanche risk forecasting service provider throughout the snow season. Risk forecasting is based on weather information collected by CN weather stations and from other sources. CN must maintain these stations and ensure their effective operation. Wireless communication is required to transmit data, which presents its own unique challenges. CN upgraded several of the weather stations in advance of this winter to further enhance our avalanche risk forecasting activities.

Besides weather information, intelligence collected from various sources concerning snow conditions is used to assess avalanche risk. A daily regional avalanche risk report is circulated early in the morning to CN Rail Traffic Control centres, Engineering track supervisors, and other individuals involved in rail operations. The daily avalanche risk report details the level of risk associated with each avalanche zone, which informs train operations and Engineering track patrols.

With weather forecasting, resources can be moved into the regions that are going to get hit the hardest by extreme weather, with emphasis on keeping yards fluid and preventing congestion.



While the threat of avalanches cannot be eliminated entirely through protective infrastructure, various types help to mitigate the impact of avalanches on train operations:

Snow and rock sheds are structures with sloped roofs situated over tracks in mountainous terrain to redirect avalanches and rockslides away from rail infrastructure.

Berms protect vulnerable track infrastructure from snow, rocks, trees, and other debris generated by avalanches. The areas behind the berms are prepared in advance of winter to maintain effective avalanche catchment and are cleared periodically.

Avalanche detectors, which are either trip wires or mercury switch tip-over posts, indicate when debris enters the right-of-way, alerting trains to restrict their speeds and be prepared to stop.

Active avalanche control: CN is proactive in active avalanche control in high-risk avalanche zones by artificially triggering small avalanches prior to them occurring in an uncontrolled fashion. Under favourable visibility and weather conditions, CN uses helicopters to drop explosives over the avalanche start zone. CN also utilizes a unique remote control avalanche management system in high-frequency avalanche paths. The system is comprised of a tall tower equipped with explosive charges.



Wildwood, AB



Moving Forward

As outlined in this 2024–2025 *CN Winter Plan*, we have developed and implemented a wide range of processes and innovations to prepare for and mitigate potential harsh winter operating conditions this coming season. By running this plan, we aim to deliver the safest and most reliable service possible for our customers, and to keep the economy moving.

Planning to run a railway during winter is not a once-a-year process. In fact, CN railroaders prepare for winter operations all year long. It is an integral part of our scheduled operating model. But we cannot do it alone. Customers need to do their part by providing detailed demand forecasts well in advance. They also need to prioritize safety and resiliency by keeping their facilities clear of ice and snow.

The Government of Canada can also play a role by thoughtfully addressing issues that create uncertainty. These include providing a stable regulatory framework that prioritizes labour productivity and eliminates extended interswitching. The NSCO should work to establish a balanced approach to reporting that improves transparency at the operational level with real-time data for all parts of the supply chain. This will help increase understanding of root causes when problems arise. Additional capacity and resiliency can be unlocked through the judicious application of capital investments in innovative technologies, processes and infrastructure that improve CN's ability to power the economy. For example, the NSCO should take whatever steps are required to enable the loading of grain into vessels even when it is raining. To support immediate investment in capacity projects across the supply chain, the Government of Canada should implement supportive tax policies and accelerated depreciation measures.

We all seek the same objective—a supply chain that operates safely and at peak efficiency. This means we must collaborate as business partners in a transparent manner, sharing information in pursuit of our common goal. We remain committed to enhancing our performance and collaborating with customers, partners and government to identify further efficiencies, setting the stage for a successful winter.



www.cn.ca/winterplan